

WHAT IS CLAIMED IS:

- 1 1. A solid-state device comprising:
2 a terminal having a plurality of fingers; and
3 wherein said fingers are arranged so that the device is heat transfer
4 balanced.
- 1 2. The device of Claim 1, wherein said fingers are arranged in a row and
2 spaced non-uniformly in the row.
- 1 3. The device of Claim 1, wherein each said finger is associated with a
2 corresponding one of a plurality of sub-cells, wherein said sub-cells are arranged in a row
3 and spaced non-uniformly.
- 1 4. The device of Claim 3, wherein each said sub-cell includes one finger.
- 1 5. The device of Claim 3, wherein each said sub-cell is associated with one
2 of a plurality of rows of sub-cells.
- 1 6. The device of Claim 3, wherein the device has a terminal area defining
2 opposed edges, and wherein adjacent ones of said sub-cells are spaced a greater distance
3 at or near a center of the device than at or near the opposed edges.
- 1 7. The device of Claim 3, wherein a number of fingers in a sub-cell at or near
2 a center of the device is less than a number of fingers in a sub-cell at or near an edge of a
3 device.
- 1 8. The device of Claim 7, wherein the device is an HBT.
- 1 9. The device of claim 8, wherein the device is a SiGe HBT.

1 10. The device of Claim 7, wherein the device defines a terminal region and
2 the terminal region is sized for a high power application.

1 11. The device of Claim 1, wherein each finger is biased for its maximum
2 current density during operation.

1 12. The device of Claim 1, wherein the device defines a layout, and the layout
2 is a ballasting resistors-free layout.

1 13. The device of Claim 1, wherein said fingers are emitter fingers.

1 14. The device of Claim 1, wherein said fingers are arranged so that a peak
2 oscillation frequency, f_{\max} , associated with the device is generally independent of the
3 number of fingers.

1 15. The device of Claim 1, wherein each said finger is associated with a
2 corresponding one of a plurality of sub-cells, and wherein said sub-cells are spaced so
3 that at least one of consecutive adjacent pairs of said sub-cells are spaced differently.

1 16. A solid-state device comprising:
2 a terminal having a plurality of fingers;
3 wherein said fingers are arranged so that a peak oscillation frequency, f_{\max} ,
4 associated with the device is generally independent of the number of said fingers.

1 17. The device of Claim 16, wherein said fingers are arranged in a row and
2 spaced non-uniformly in the row.

1 18. The device of Claim 16, wherein each said finger is associated with a
2 corresponding one of a plurality of sub-cells, wherein said sub-cells are arranged in a row
3 and spaced non-uniformly.

1 19. The device of Claim 18, wherein said sub-cells are arranged in a plurality
2 of non-uniformly spaced rows.

1 20. The device of Claim 18, wherein said sub-cells each includes one finger

1 21. The device of Claim 17, wherein the device has a terminal area defining
2 opposed edges, and wherein adjacent ones of said sub-cells are spaced a greater distance
3 at or near a center of the device than at or near the opposed edges.

1 22. The device of Claim 16, wherein each finger is biased for its maximum
2 current density.

1 23. The device of Claim 16, wherein the device is an HBT, and said fingers
2 are emitter fingers.

1 24. A method of producing a high power solid-state device comprising:

2 providing a substrate for supporting a terminal having a plurality of
3 fingers; and

4 arranging the fingers in a plurality of sub-cells defining at least one row so
5 that the device is heat transfer balanced.

1 25. The method of Claim 24, wherein said sub-cells are arranged so that
2 consecutive adjacent pairs of the sub-cells in the at least one row are spaced differently.

1 26. The method of Claim 24, wherein the at least one row includes a plurality
2 of rows.

1 27. The method of Claim 26, wherein the sub-cells between the plurality of
2 rows are spaced non-uniformly.

1 28. The method of Claim 24, further comprising determining a number of the
2 sub-cells and spacings between the sub-cells using a thermal simulation program.

1 29. The method of Claim 28, wherein the thermal simulation program uses
2 finite element analysis.

1 30. The method of Claim 24, wherein the device is one of an HBT and a FET.

1 31. The method of Claim 24, wherein the device defines a layout that is
2 ballasting resistors-free.

1 32. A method of heat transfer balancing a solid-state device, the method
2 comprising:

3 arranging a plurality of fingers of a terminal of the device so that a
4 junction temperature across the device in operation is generally uniform without using
5 ballasting resistors.

1 33. The method of Claim 32, wherein each finger is biased for its maximum
2 current density.

1 34. The method of Claim 33, wherein the device is an HBT, and the terminal is
2 an emitter terminal.